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**(54) OPTICAL INFORMATION RECORDING MEDIUM AND METHOD FOR RECORDING INFORMATION**

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a heat mode type optical information recording medium which can obtain high recording sensitivity even when visible laser beams are used besides near infrared laser beams and attain high reflectance, and a information recording method.

SOLUTION: In a heat mode type optical record recording medium having a recording layer which can record information by the irradiation of laser beams, the recording layer contains a cyanine coloring matter compound expressed by a formula  $[DYE^+]_nX_n^-$  ( $DYE^+$  is a monovalent cyanine coloring matter cation,  $n$  is integer of 2 or more,  $X_n^-$  is  $n$ -valent anion), and a DVD-R type optical recording medium is irradiated with laser beams of 630-680nm wavelength to record information.

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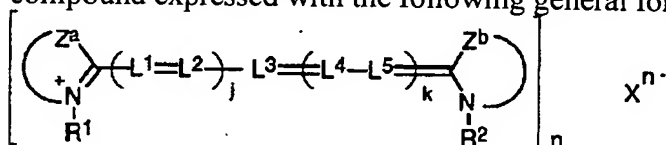
## CLAIMS

[Claim(s)]

[Claim 1] Optical information record-medium: [DYE<sup>+</sup>] <sub>n</sub> X<sub>n</sub><sup>-</sup> to which it is the optical information record medium of the heat mode type which has the record layer which can record information by irradiation of a laser beam on a substrate, and this record layer is characterized by containing the cyanine-dye compound expressed with the following general formula (I) (I)

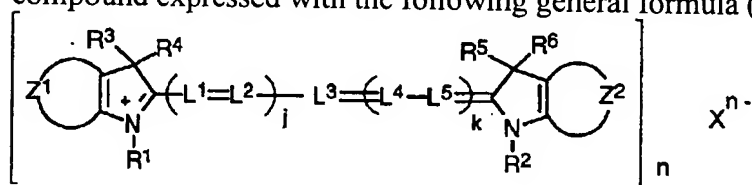
The inside of a formula, and DYE<sup>+</sup> A monovalent cyanine-dye cation is expressed, n expresses two or more integers, and X<sub>n</sub><sup>-</sup> expresses the multiple-valued anion of n \*\*.

[Claim 2] Optical information record medium according to claim 1 whose cyanine-dye compound is a compound expressed with the following general formula (II) : [Formula 1]



An atomic group required in order that Z<sup>a</sup> and Z<sup>b</sup> may complete the nitrogen-containing heterocycle of 5 members or 6 members independently respectively is expressed among a formula. R<sup>1</sup> And R<sup>2</sup> An alkyl group or an aryl group is expressed independently respectively. L<sup>1</sup>, L<sup>2</sup>, L<sup>3</sup>, and L<sup>4</sup> And L<sup>5</sup> The methine group which is not replaced [ substitution or ] is expressed independently respectively. (However, it connecting mutually and a ring's being formed, when a substituent's is on L<sup>1</sup> - L<sup>5</sup>), and j express 0, 1, or 2, k expresses 0 or 1, and X<sub>n</sub><sup>-</sup> expresses the multiple-valued anion of n \*\*, and n expresses two or more integers.

[Claim 3] Optical information record medium according to claim 1 whose cyanine-dye compound is a compound expressed with the following general formula (IIA) : [Formula 2]



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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the optical information record medium and the information record method of a heat mode type that informational record and informational reproduction can be performed using a laser beam. Especially, this invention was suitable for recording information using a near-infrared laser beam or visible laser light, for example, relates to the optical information record medium of a heat mode type like an added-a postscript type optical disk (CD-R) or an added-a postscript type digital videodisc (DVD-R).

[0002]

[Description of the Prior Art] From the former, the optical information record medium (optical disk) which can record the information on a limitation is known once by the laser beam. This optical information record medium is also called a recordable compact disk (the so-called CD-R), and the typical structure carries out the laminating of the light reflex layer which consists of metals which consist of an organic coloring matter on a transparent disk-like substrate, such as a record layer and gold, and the protective layer of further the product made of a resin to this order. And record of the information on this layered product is performed by irradiating the laser beam (usually laser beam of the wavelength near 780nm) of a near-infrared region, and carrying out exoergic deformation of the record layer locally. On the other hand, reading (reproduction) of information usually irradiates the laser beam for record, and the laser beam of the same wavelength, and is performed by detecting the difference in the reflection factor of the part (record portion) by which exoergic deformation of the record layer was carried out, and the part (non-recorded portion) not deforming.

[0003] In recent years, the optical higher information record medium of recording density is called for with the spread of personal computers etc. Since a laser beam with shorter wavelength can extract small effectively [ extracting \*\*\*\* of the laser irradiated small ] in order to raise recording density, it is known theoretically that it is advantageous to densification. Therefore, the optical disk which development of the optical disk for performing record reproduction using the laser beam of short wavelength from 780nm used from the former is furthered, for example, is called a recordable digital videodisc (the so-called DVD-R) is proposed. the record layer which consists of coloring matter on the transparent disk-like substrate this optical disk of whose is the diameter of 120mm in which the 0.8-micrometer pre groove with a track pitch narrower [ CD-R ] than 1.6 micrometers was formed -- and Usually, it is manufactured so that it may become the structure which carries out this record layer inside for the disk-like protective-group board of the same configuration as two sheets or this disk, and stuck with adhesives the disk which comes to prepare a light reflex layer and a protective layer further on this record layer. And by irradiating visible laser light (usually laser beam of the wavelength of the range of 630nm - 680nm), record and reproduction are performed and record higher-density than CD-R of DVD-R is enabled.

[0004] Since the wavelength of the laser beam used for record reproduction in the design of the above-mentioned DVD-R is shorter than CD-R, it is necessary to also make the absorption-maximum

wavelength of the coloring matter used for a coloring matter record layer short-wavelength-ize according to this. However, generally, the bird clapper is known by long wavelength, so that the breadth of the pie electronic system which caused the optical absorption is large, and the absorption-maximum wavelength of coloring matter turns into long wavelength, so that the length of a conjugate methine chain is long in the case of the cyanine dye put in practical use by especially the optical disk of the former many. That is, although it is effective to shorten the length of a conjugate methine chain in order to make the absorption-maximum wavelength of coloring matter short-wavelength-ize, if the length of a conjugate methine chain becomes short, since an absorbancy index will become small shortly, the fall (fall of a modulation factor) of record sensitivity becomes easy to take place inevitably. Therefore, it is difficult to obtain the performance which should be satisfied as coloring matter for DVD-R only by having shortened the length of the conjugate methine chain of the conventional coloring matter for CD-R, and only, short-wavelength-izing the absorption-maximum wavelength.

[0005] On the other hand, it must be so high that the reflection factor in 780nm can read by the commercial CD player in CD-R. In order to make [ many ] the quantity of light reflected in the metal light reflex layer prepared on the coloring matter record layer, it is thought preferably [ a low thing ] therefore by the rate of an optical absorption by coloring matter that the absorption-maximum wavelength of coloring matter has the shorter good one. However, if the coloring matter which has absorption-maximum wavelength in a short wavelength side is used, change of the reflection factor of the record portion in 780nm and a non-recorded portion will decrease, and the problem that it becomes difficult to detect the difference will arise. Therefore, in the conventional CD-R, the coloring matter with which record sensitivity with it is obtained chooses, and is used. [ a high and reflection factor and ] [ high ] For example, as such coloring matter, the cyanine dye which has the benzo INDO renin skeleton of a publication is preferably used for JP,64-40382,A. However, the conventional cyanine dye cannot necessarily say a reflection factor and record sensitivity as that with which satisfaction goes enough, but the further improvement is desired.

[0006] The cyanine dye suitable as an object for CD-R by which a reflection factor is presupposed that it is high and the remarkable improvement effect is acquired also in record reproducing characteristics, such as sensitivity, and C/N-ary, is proposed by JP,4-175188,A. And it is indicated that this cyanine dye can have a univalent - trivalent anion. However, it is indicating only about the cyanine dye which combined the univalent anion as an example, and there is no publication about how a cyanine dye is combined about a divalent or trivalent anion.

[0007]

[Problem(s) to be Solved by the Invention] The technical problem of this invention is facing recording information using a laser beam and offering the record method of the optical information record medium of the high heat mode type of record sensitivity, and information. It is offering especially the optical information record medium and the information record method record sensitivity's high even when using visible laser light's (for example, red laser beam's with a wavelength of 630-'s680nm) being obtained, in this invention. Moreover, the technical problem of this invention is also offering the optical information record medium of the heat mode type which is a high reflection factor and can attain high record sensitivity.

[0008]

[Means for Solving the Problem] It was found out that the optical information record medium in which a reflection factor with it is shown by research of this invention person compared with the former by using the cyanine-dye compound which combined the anion of a multiple valued and two or more cyanine-dye components which doubled the valence with it can be manufactured. [ high and record sensitivity and ] [ high ] It turns out that especially the cyanine-dye compound that combined a multiple-valued anion and two or more cyanine-dye components of the monovalent cation state where the length of a conjugate methine chain is comparatively short can be advantageously used in the optical DVD-R type information record medium which records information using the laser beam of short wavelength.

[0009] this invention is the optical information record medium of the heat mode type which has the record layer which can record information by irradiation of a laser beam on a substrate, and this record

layer is following (general formula I): [DYE+] n Xn-. (I)

[-- DYE+ expresses a monovalent cyanine-dye cation among a formula, n expresses two or more integers, and Xn- expresses the multiple-valued anion of n \*\*] It is in the optical information record medium characterized by coming out and containing the cyanine-dye compound expressed.

[0010] Moreover, the diameter of this invention in which the pre groove of 0.6-0.9 micrometers of track pitches was formed is 120\*\*0.3mm. The layered product of two sheets in which it comes to prepare the record layer containing the cyanine-dye compound expressed with the following general formula (I) to the side in which this pre groove of the transparent disk-like substrate whose thickness is 0.6\*\*0.1mm was prepared The diameter in which the pre groove of 0.6-0.9 micrometers of track pitches was formed or by 120\*\*0.3mm The layered product to which it comes to prepare the record layer containing the cyanine-dye compound expressed with the following general formula (I) to the side in which this pre groove of the transparent disk-like substrate whose thickness is 0.6\*\*0.1mm was prepared, It is also in the optical information record medium of a heat mode type with a thickness of 1.2\*\*0.2mm which joins and becomes about this disk-like substrate and the same disk-like protective-group board with a transparent configuration so that each record layer may serve as the inside.

[DYE+ ]n Xn- (I)

[-- DYE+ expresses a monovalent cyanine-dye cation among a formula, n expresses two or more integers, and Xn- expresses the multiple-valued anion of n \*\*]

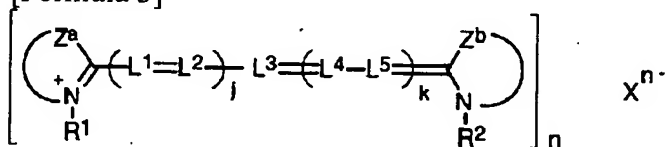
[0011] Furthermore, this invention is also in the information record method which irradiates a laser beam with a wavelength of 630nm - 680nm, and records information on the optical information record medium of the above-mentioned composition.

[0012] As for this invention, it is desirable that they are the following modes.

(1) A cyanine-dye compound is a compound expressed with the following general formula (II).

[0013]

[Formula 3]

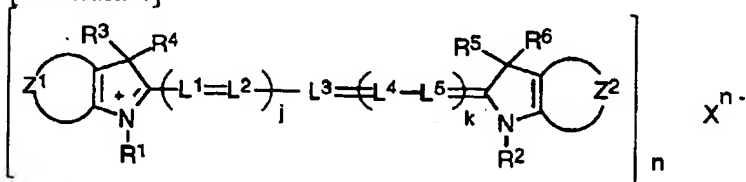


An atomic group required in order that Za and Zb may complete the nitrogen-containing heterocycle of 5 members or 6 members independently respectively is expressed among [formula. R1 And R2 An alkyl group or an aryl group is expressed independently respectively. L1, L2, L3, and L4 And L5 The methine group which is not replaced [ substitution or ] is expressed independently respectively. (however, it connecting mutually and a ring's being formed, when a substituent's is on L1 - L5), and j express 0, 1, or 2, k expresses 0 or 1, and Xn- expresses the multiple-valued anion of n \*\*, and n expresses two or more integers ]

(2) A cyanine-dye compound is a compound expressed with the following general formula (IIA).

[0014]

[Formula 4]



Z1 and Z2 express an atomic group required in order to complete the India renin nucleus or a benzo INDO renin nucleus independently respectively among [formula. R1 And R2 An alkyl group or an aryl group is expressed independently respectively. R3, R4, and R5 And R6 An alkyl group is expressed independently respectively. L1, L2, L3, and L4 And L5 The methine group which is not replaced

[ substitution or ] is expressed independently respectively. (however, it connecting mutually and a ring's being formed, when a substituent's is on L1 - L5), and j express 0, 1, or 2, k expresses 0 or 1, and Xn- expresses the multiple-valued anion of n \*\*, and n expresses two or more integers ]

(3) The above-mentioned general formula (II) Or (IIA) it sets and j is 0 or 1.

(4) A cyanine-dye compound is a compound which has the India renin nucleus or a benzo INDO renin nucleus with a TORIMECHIN chain.

[0015] (5) The above-mentioned general formula (II) Or (IIA) it sets and n is 2-4 (still more preferably 2).

(6) The above-mentioned general formula (II) It sets. or (IIA) X2- Benzene -1, 3-disulfon acid ion, 3, and 3'-biphenyl disulfon acid ion, Naphthalene -1, 5-disulfon acid ion, naphthalene -1, 6-disulfon acid ion, Naphthalene -2, 6-disulfon acid ion, the 1-methylnaphthalene -2, 6-disulfon acid ion, Naphthalene -2, 7-disulfon acid ion, naphthalene -2, 8-disulfon acid ion, They are 2-naphthol -6, 8-disulfon acid ion, 1, 8-dihydroxy naphthalene -3, 6-disulfon acid ion or 1, 5-dihydroxy naphthalene -2, and 6-disulfon acid ion.

(7) The above-mentioned general formula (II) Or (IIA) it sets and X2- is naphthalene -1, 5-disulfon acid ion, naphthalene -1, 6-disulfon acid ion, the 1-methylnaphthalene -2, 6-disulfon acid ion, naphthalene -2, 6-disulfon acid ion, naphthalene -2, 7-disulfon acid ion or naphthalene -2, and 8-disulfon acid ion.

(8) The above-mentioned general formula (II) Or (IIA) it sets and X2- is naphthalene -1 and 5-disulfon acid ion.

[0016] (9) A substrate is a transparent disk-like substrate in which the pre groove of 1.4-1.8 micrometers of track pitches was formed and whose thickness a diameter is  $120 \pm 0.3$  mm and is  $1.2 \pm 0.2$  mm, and is the optical CD-R type information record medium with which the record layer is prepared in the near front face in which this pre groove was formed.

(10) A substrate is a transparent disk-like substrate in which the pre groove of 0.6-0.9 micrometers of track pitches was formed and whose thickness a diameter is  $120 \pm 0.3$  mm and is  $0.6 \pm 0.1$  mm, and is the optical DVD-R type information record medium with which the record layer is prepared in the near front face in which this pre groove was formed.

(11) The light reflex layer which consists of a metal further is prepared on the record layer.

(12) The protective layer is further prepared on the light reflex layer.

[0017]

[Embodiments of the Invention] The optical information record medium of this invention is characterized by a record layer containing the cyanine-dye compound expressed with the following general formula (I).

[DYE+]<sub>n</sub> Xn- (I)

The cyanine dye expressed with a general formula (I) below is explained in full detail. The cyanine-dye cation expressed with DYE expresses the univalent cation which does not have the substituent of anion nature. Moreover, Xn- expresses the anion of n \*\* and n expresses two or more integers. That is, Xn- expresses the multiple-valued anion more than divalent.

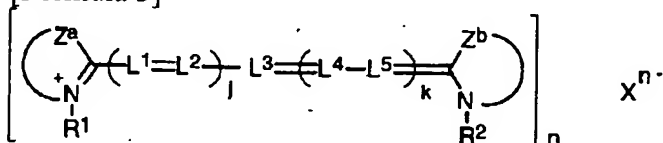
[0018] Even if the multiple-valued anion expressed with Xn- is an inorganic anion, it may be an organic anion. As an example of an inorganic multiple-valued anion, heteropolyacid ion, such as a sulfate ion, phosphoric-acid ion, a phosphoric-acid hydrogen ion, and tungstophosphoric-acid ion, is mentioned. as the example of an organic multiple-valued anion -- carboxylic-acid ion (for example, succinic-acid ion --) maleic-acid ion, fumaric-acid ion, terephthalic-acid ion, and aromatic disulfon acid ion (an example --) Benzene -1, 3-disulfon acid ion, 3, and 3'-biphenyl disulfon acid ion, Naphthalene -1, 5-disulfon acid ion, naphthalene -1, 6-disulfon acid ion, Naphthalene -2, 6-disulfon acid ion, the 1-methylnaphthalene -2, 6-disulfon acid ion, Naphthalene -2, 7-disulfon acid ion, naphthalene -2, 8-disulfon acid ion, 2-naphthol -6, 8-disulfon acid ion, 1, 8-dihydroxy naphthalene -3, 6-disulfon acid ion, 1, 5-dihydroxy naphthalene -2, 6-disulfon acid ion, aromatic tris RUHON acid ion (example and naphthalene -1, 3, and 5-tris RUHON acid ion --) Naphthalene -1, 3, 6-tris RUHON acid ion, naphthalene -1, 3, 7-tris RUHON acid ion, 1-naphthol -3, 6, 8-tris RUHON acid ion, 2-naphthol -3, 6, 8-tris RUHON acid ion, Aromatic tetrapod sulfonic-acid ion (an example, naphthalene -1, 3 and 5, 7-tetrapod sulfonic-acid ion),

aliphatic polysulfone acid ion (an example, butane -1, and 4-disulfon acid ion --) A cyclohexane -1, 4-disulfon acid ion, the poly sulfuric monoester (an example, a propylene glycol -1, 2-JISURUFETO, polyvinyl alcohol poly sulfate ion), etc. are mentioned. In this invention, it is desirable still more desirable that it is the anion of 2 - tetravalence, and  $X^{n-}$  is 2 or a trivalent anion and is an especially divalent anion.

[0019] As for the cyanine-dye compound used by this invention, it is desirable that it is the compound expressed with the following general formula (II).

General formula (II) : [0020]

[Formula 5]



[0021] In a general formula (II),  $Z^a$  and  $Z^b$  express an atomic group required in order to complete the nitrogen-containing heterocycle of 5 members or 6 members independently respectively.  $R^1$  And  $R^2$  An alkyl group or an aryl group is expressed independently respectively.  $L^1$ ,  $L^2$ ,  $L^3$ , and  $L^4$  And  $L^5$  The methine group which is not replaced [ substitution or ] is expressed independently respectively. Moreover,  $L^1$  - $L^5$  When it has a substituent upwards, it may connect mutually and a ring may be formed.  $j$  expresses 0, 1, or 2 and  $k$  expresses 0 or 1.  $X^{n-}$  expresses the multiple-valued anion of  $n^{**}$ , and  $n$  expresses two or more integers.

[0022] As a nitrogen-containing heterocycle (nucleus) of 5 members expressed with  $Z^a$  and  $Z^b$ , or 6 members For example, a thiazole nucleus, a benzothiazole nucleus, a naphth thiazole nucleus, A thiazoline nucleus, an oxazole nucleus, a benzo oxazole nucleus, a naphth oxazole nucleus, An oxazoline nucleus, a selenazole nucleus, benzoselenazole nucleus, a naphthoselenazole nucleus, A SERENAZORIN nucleus, a tetrazole nucleus, a benzotellurazole nucleus, a naphth tetrazole nucleus, A TERURAZORIN nucleus, an imidazole nucleus, a benzimidazole nucleus, a naphth imidazole nucleus, A pyridine nucleus, a quinoline nucleus, an isoquinoline nucleus, the [4 and 5-imidazo b] quinoxaline nucleus, an OKISA diazole nucleus, a thiadiazole nucleus, a tetrazole nucleus, a pyrimidine nucleus, etc. can be mentioned. In these, a benzothiazole nucleus, an imidazole nucleus, a naphth imidazole nucleus, a quinoline nucleus, an isoquinoline nucleus, the [4 and 5-imidazo b] quinoxaline nucleus, a thiadiazole nucleus, a tetrazole nucleus, and a pyrimidine nucleus are desirable. To these rings, the benzene ring and the naphthoquinone ring may condense further.

[0023] The nitrogen-containing heterocycle of the above-mentioned 5 members or 6 members may have the substituent. As an example of a desirable substituent (atom), the alkyl group which is not replaced [ a halogen atom, substitution, or ] and an aryl group can be mentioned. As a halogen atom, a chlorine atom is desirable. The alkyl group of an alkyl group of the shape of a straight chain of the carbon atomic numbers 1-6 is desirable. Moreover, as an example of the substituent of an alkyl group, an alkoxy group (an example, methoxy) and an alkyl thio machine (an example, methylthio) can be mentioned. As an aryl group, a phenyl is desirable.

[0024] Above  $R^1$  And  $R^2$  The alkyl group expressed may have the substituent and is an alkyl group of the shape of a straight chain of the carbon atomic numbers 1-18 (still more preferably 1-8, especially 1-6), annular, or the letter of branching preferably.  $R^1$  And  $R^2$  The aryl group expressed is an aryl group which may have the substituent and may have the substituent of the carbon atomic numbers 6-18 preferably.

[0025]  $R^1$  And  $R^2$  The following can be mentioned as an example of the desirable substituent which the alkyl group expressed or an aryl group has. the aryl group (for example, a phenyl --) which is not replaced [ the substitution of the carbon atomic numbers 6-18, or ] Chlorophenyl, anisyl, toluyll one, 2, a 4-G t-amyl, 1-naphthyl, An alkenyl machine (for example, a vinyl, 2-methyl vinyl), an alkynyl group For example, (an ethynyl, 2-methyl ethynyl, 2-phenyl ethynyl), A halogen atom (for example, F, Cl, Br, I), a cyano group, a hydroxyl, a carboxyl group and an acyl group (for example, an acetyl, a benzoyl,



and a SARICHI roil --) Pivaloyl, an alkoxy group (for example, a methoxy, butoxy one, cyclohexyloxy), An aryloxy group (for example, a phenoxy, 1-naphthoxy), an alkyl thio machine For example, (a methylthio, a butyl thio, a benzyl thio, 3-methoxy propyl thio), An aryl thio machine (for example, phenylthio, 4-chloro phenylthio), An alkyl sulfonyl machine (for example, a methane sulfonyl, a butane sulfonyl), An aryl sulfonyl machine (for example, benzenesulphonyl, a PARATORU en sulfonyl), The carbamoyl group of the carbon atomic numbers 1-10, the amide group of the carbon atomic numbers 1-10, The acyloxy machine of the carbon atomic numbers 2-10, the alkoxy carbonyl group of the carbon atomic numbers 2-10, Heterocycle machine (for example, aliphatic heterocycles, such as complex aromatic rings, such as pyridyl, a thienyl, a furil, thiazolyl, imidazolyl, and pyrazolyl, a pyrrolidine ring, a piperidine ring, a morpholine ring, a pyran ring, a thiopyran ring, a dioxane ring, and a dithiolane ring).

[0026] this invention -- setting -- the above R1 And R2 They are the non-replaced carbon atomic numbers 1-8 (preferably), respectively. The alkyl group of the shape of a straight chain of the carbon atomic numbers 1-6, especially the carbon atomic numbers 1-4, Or it is desirable that it is the alkyl group of the shape of a straight chain of the carbon atomic numbers 1-8 (preferably the carbon atomic numbers 1-6, especially carbon atomic numbers 1-4) replaced with the alkoxy group (especially methoxy) or the alkyl thio machine (especially methylthio).

[0027] L1 -L5 The methine group expressed may have the substituent. As an example of a desirable substituent, they are the alkyl group of the carbon atomic numbers 1-18, an aralkyl machine, and the above R1. And R2 What was mentioned as an example of the desirable substituent which the alkyl group expressed or an aryl group has can be mentioned. In these, an alkyl group (an example, methyl), an aryl group (an example, phenyl), a halogen atom (an example, Cl, Br), and an aralkyl machine (an example, benzyl) are desirable. As for j and k, in this invention, it is respectively desirable that it is 0 or 1 independently.

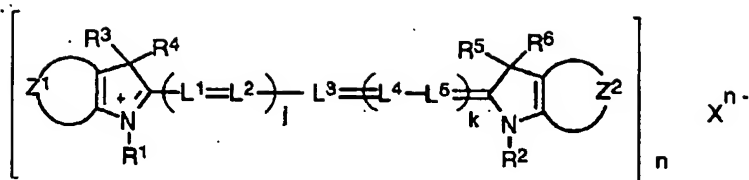
[0028] Above-mentioned L1 -L5 The upper substituent may be connected mutually and may form a ring. The desirable ring number is 5 member rings or 6 member rings, and these two or more rings may condense it. A connection position changes with number of the methine chains formed. L1 -L5 [ for example, ] the case where the methine chain formed is a pentamethine chain -- the desirable connection position -- L1, L3, and L2 L4 and L3 L5 it is . moreover, the connection position in the case of forming the double condensed ring -- L1 L3 L5 it is . moreover, this case -- L1 R1 and L5 R2 -- further -- L3 R2 It connects mutually, the ring may be formed and the ring number is 5 member rings or 6 member rings preferably. It sets to this invention and is L1 -L5. As for the ring formed by the upper substituent, it is desirable that it is a cyclohexene ring.

[0029] Xn- and n are Xn- and n which were explained in the aforementioned general formula (I), respectively, and homonymy. As for Xn-, in a general formula (II), it is desirable that they are the aforementioned aromatic disulfon acid ion or aromatic trisulfon acid ion. Preferably Furthermore, benzene -1, 3-disulfon acid ion, 3, and 3'-biphenyl disulfon acid ion, Naphthalene -1, 5-disulfon acid ion, naphthalene -1, 6-disulfon acid ion, Naphthalene -2, 6-disulfon acid ion, the 1-methylnaphthalene -2, 6-disulfon acid ion, Naphthalene -2, 7-disulfon acid ion, naphthalene -2, 8-disulfon acid ion, 2-naphthol -6, 8-disulfon acid ion, 1, 8-dihydroxy naphthalene -3, 6-disulfon acid ion, They are 1, 5-dihydroxy naphthalene -2, and 6-disulfon acid ion. preferably especially Naphthalene -1, 5-disulfon acid ion, naphthalene -1, 6-disulfon acid ion, Naphthalene -2, 6-disulfon acid ion, one methylnaphthalene -2, 6-disulfon acid ion, It is naphthalene -2, 7-disulfon acid ion or naphthalene -2, and 8-disulfon acid ion, and the most desirable things are naphthalene -1 and 5-disulfon acid ion.

[0030] As for the cyanine-dye compound used by this invention, it is desirable that it is the compound expressed with the following general formula (IIA).

General formula (IIA) : [0031]

[Formula 6]



[0032] It sets to a general formula (IIA) and is Z1. And Z2 An atomic group required in order to complete the India renin nucleus or a benzo INDO renin nucleus is expressed. R1 And R2 An alkyl group or an aryl group is expressed independently respectively. R3, R4, and R5 And R6 An alkyl group is expressed independently respectively. L1, L2, L3, and L4 And L5 The methine group which is not replaced [ substitution or ] is expressed independently respectively. Moreover, L1 -L5 When it has a substituent upwards, it may connect mutually and a ring may be formed. j expresses 0, 1, or 2 and k expresses 0 or 1. Xn- expresses the multiple-valued anion of n \*\*, and n expresses two or more integers.

[0033] Above Z1 And Z2 The India renin nucleus or benzo INDO renin nucleus with which it is expressed may have the substituent. A halogen atom or an aryl group can be mentioned as a substituent (atom). As a halogen atom, a chlorine atom is desirable. Moreover, as an aryl group, a phenyl is desirable.

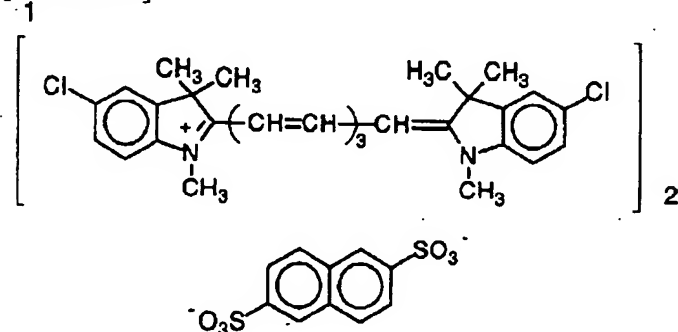
[0034] The above R3, R4, and R5 And R6 The alkyl group expressed is the shape of a straight chain of the carbon atomic numbers 1-18, a letter of branching, or an annular alkyl group preferably. Moreover, R3 R4 and R5 R6 It may connect, respectively and a ring may be formed. R3, R4, and R5 And R6 The alkyl group expressed may have the substituent. A thing desirable as a substituent is the above R1. And R2 What was mentioned as an example of the desirable substituent which the alkyl group expressed or an aryl group has can be mentioned. It sets to this invention and is R3, R4, and R5. And R6 As for the alkyl group expressed, it is desirable that it is the alkyl group (especially a methyl, ethyl) which is not replaced [ of the shape of a straight chain of the \*\*\*\*\* carbon atomic numbers 1-6 ].

[0035] It sets to a general formula (IIA) and is R1. And R2, L1, L2, L3, and L4 And L5, j and k, Xn-, and n express the same meaning as them which were explained in the general formula (II), respectively. Moreover, it is the same as the explanation in the aforementioned general formula (II) also of those desirable instantiation.

[0036] The desirable example of a compound expressed below, (including general formula (II) or (IIA) the compound expressed) is given. [ the general formula (I) concerning this invention and ]

[0037]

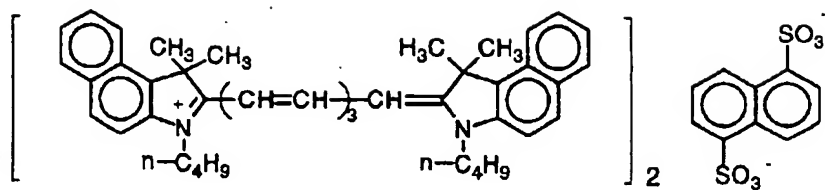
[Formula 7]



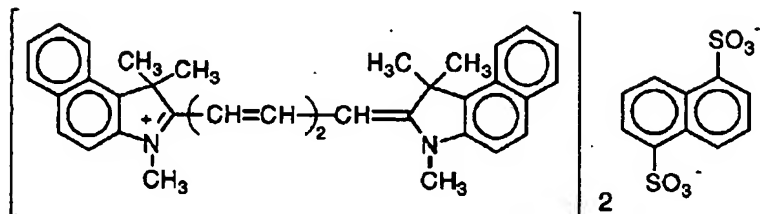
[0038]

[Formula 8]

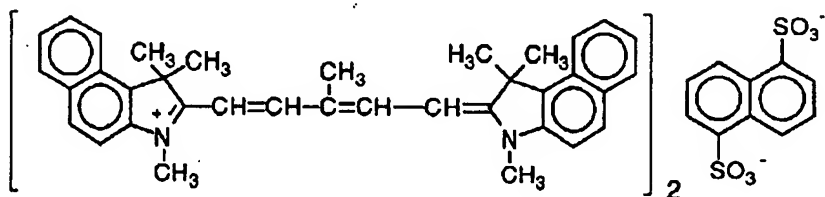
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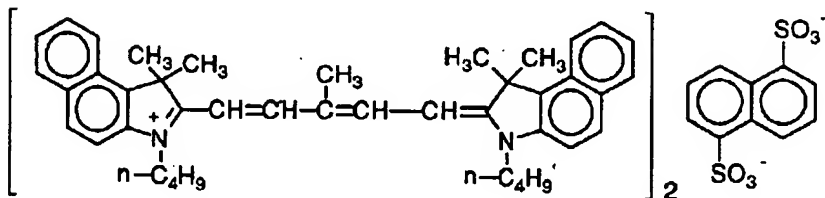
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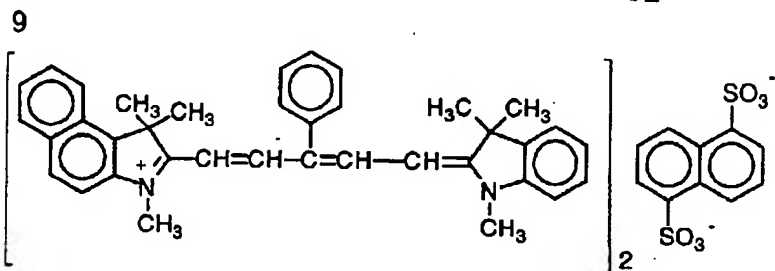
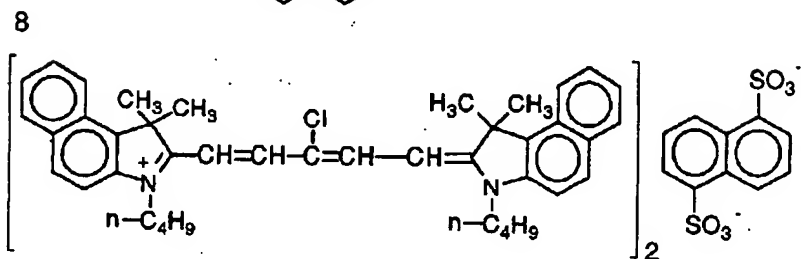
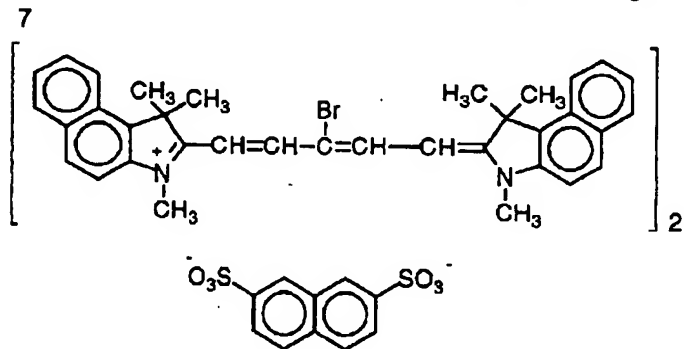
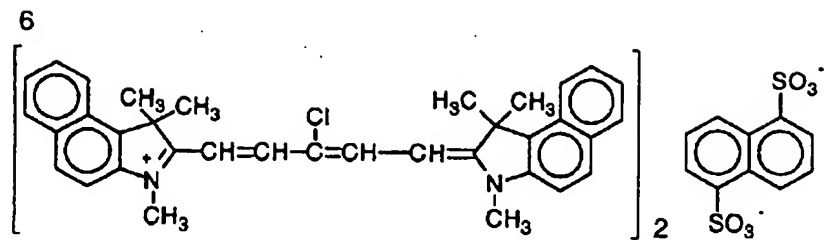


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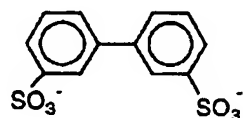
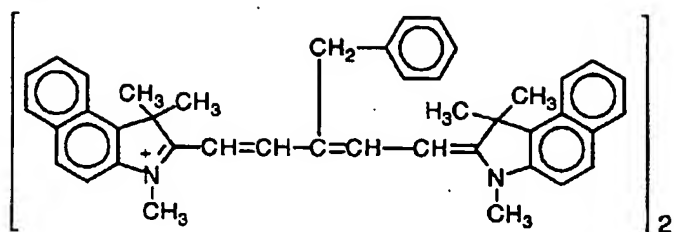
[0039]

[Formula 9]

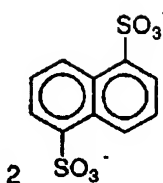
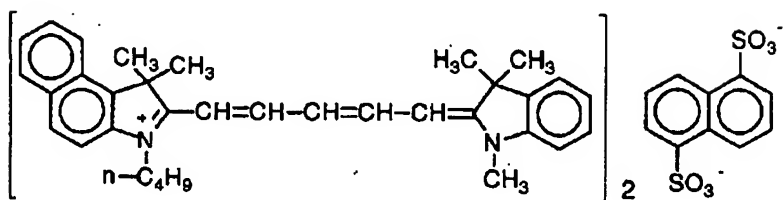


[0040]  
[Formula 10]

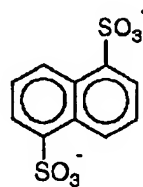
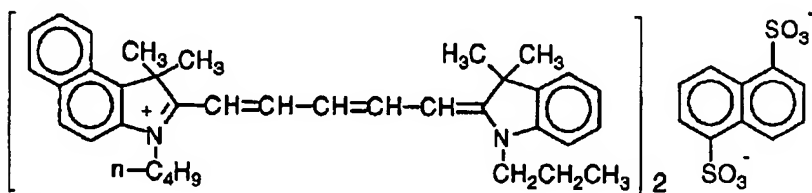
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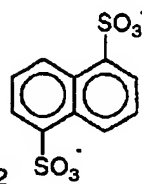
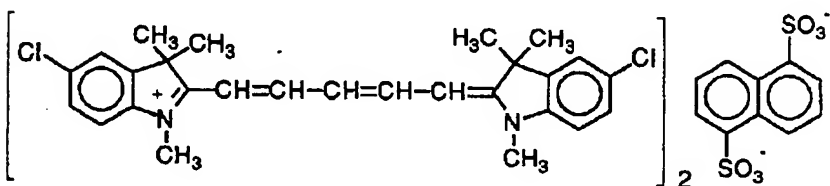
1 1



1 2



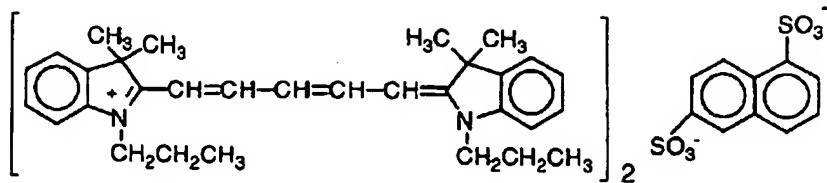
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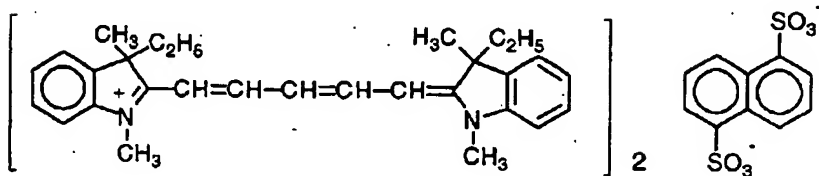
[0041]

[Formula 11]

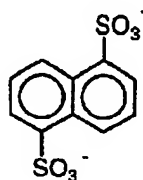
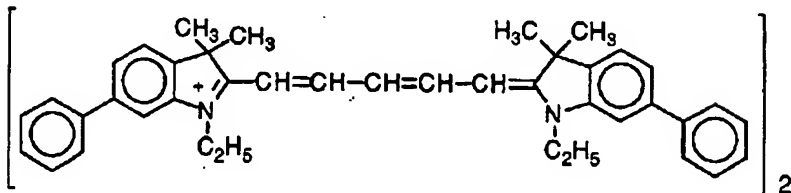
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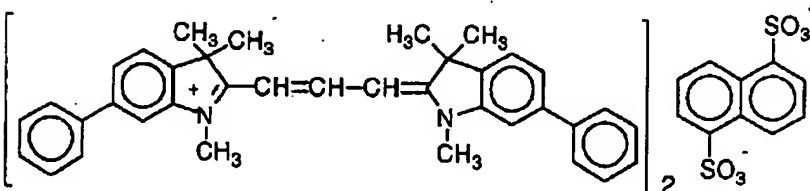
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1 6



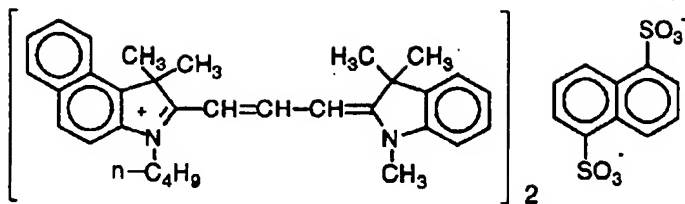
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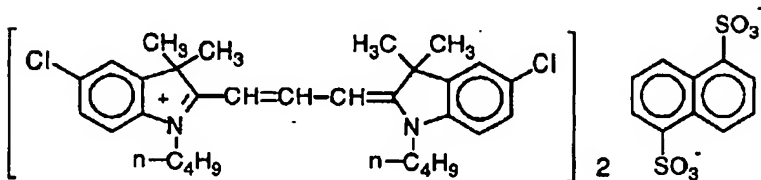
[0042]

[Formula 12]

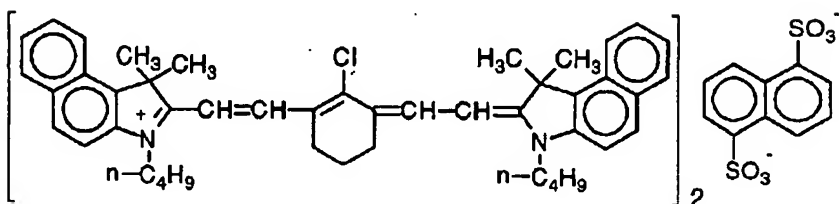
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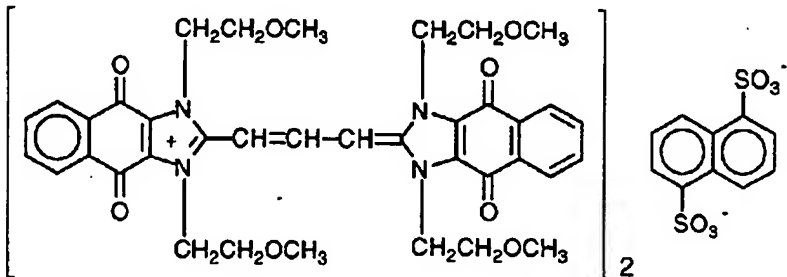
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2 0



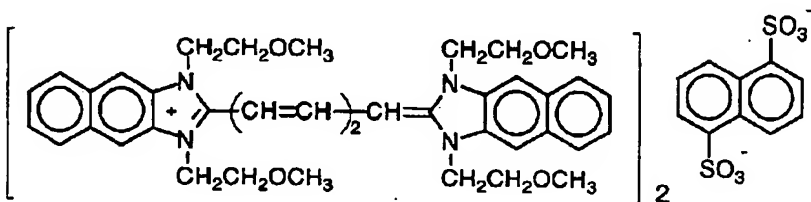
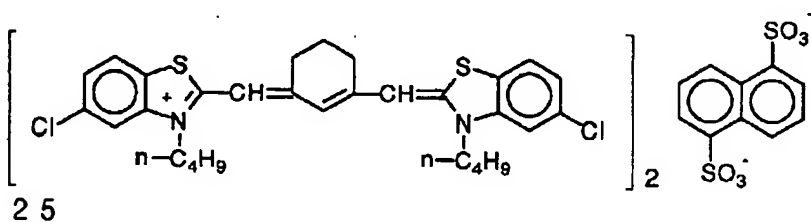
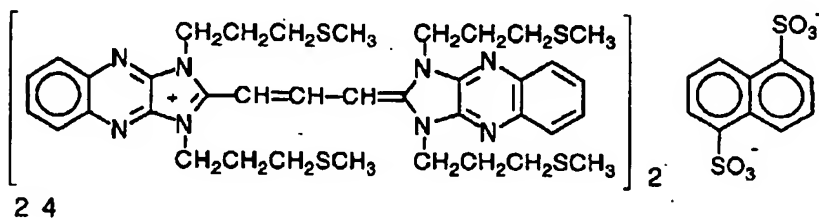
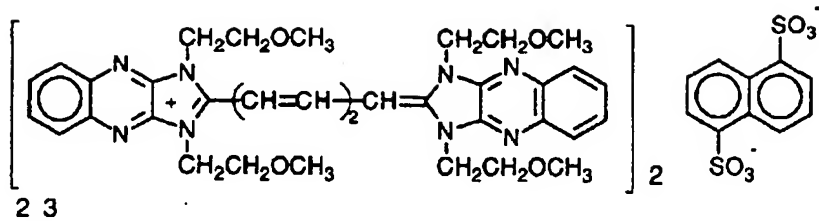
2 1



[0043]

[Formula 13]

2 2

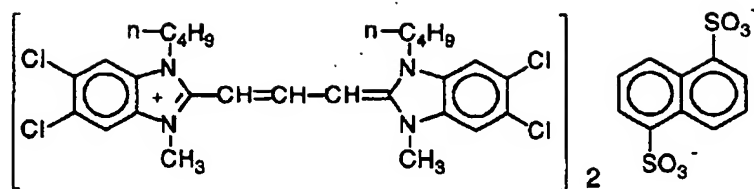


[0044]

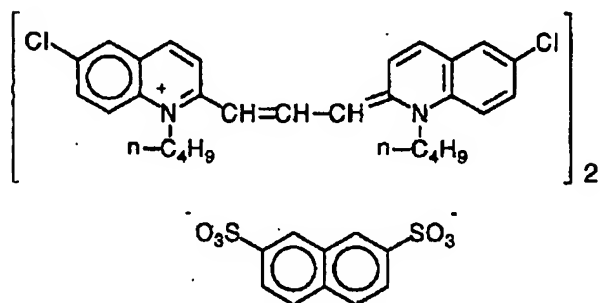
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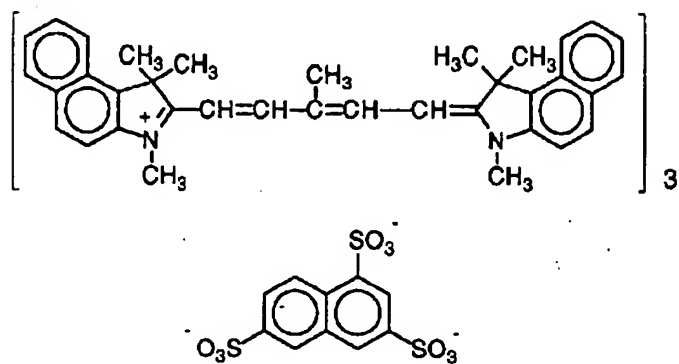
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2 7



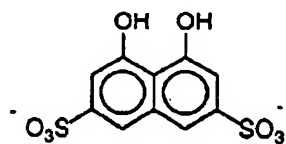
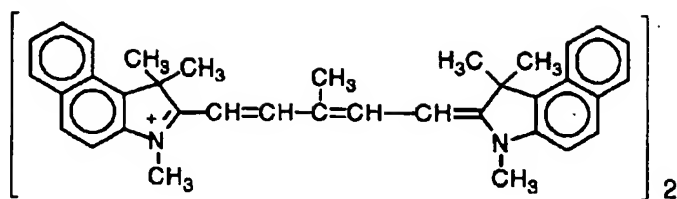
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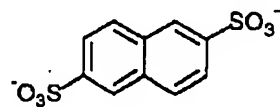
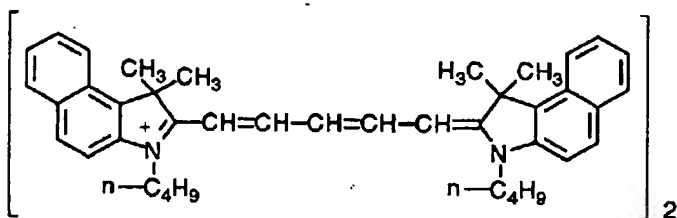
[0045]

[Formula 15]

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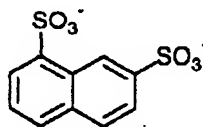
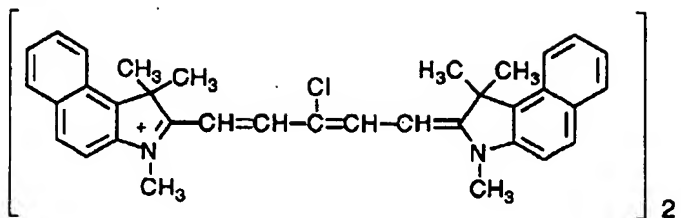
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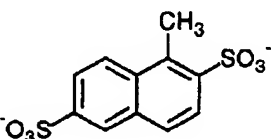
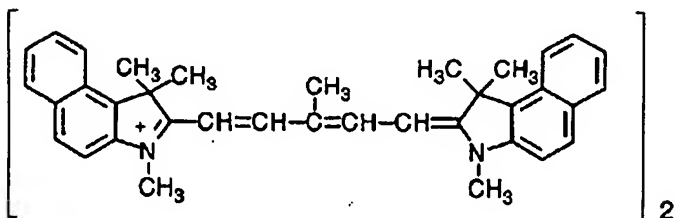
[0046]

[Formula 16]

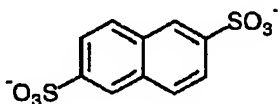
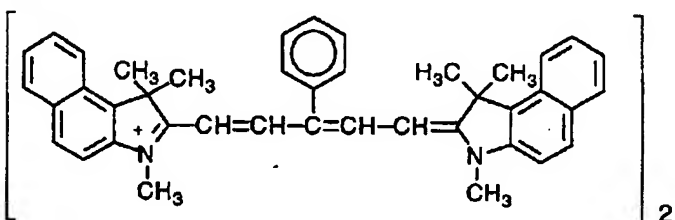
3 1



3 2



3 3



The compound expressed with the above-mentioned general formula (I) concerning this invention may be used independently, or may use two or more sorts together again. In addition, already, the compound expressed with the general formula (I) concerning this invention can refer to the publication of the well-known following reference, and can compound it easily.

[0047] as these reference -- "written by F.M Harmer -- THE cyanine soybean - and - related party UNZU 5 (Interscience Publishers --) FABIAN N. -- Y.1964 or subsequent ones 55-page; -- Nicolai CHUCHURUKOFU and Jurgen - [ per year ] An AKIMU mail horn, FIRITTSU DIETSU, Aria TAJIERU (Nikolai Tyutyulkov, Jurgen Fabian, Achim Ulehlhorn, Fritz Dietz, Alia Tadjer) collaboration "poly methine soybeans", A cent chestnut MENTO ORIZUKI university press, Sofia (St.Kliment Ohridski University Press and Sophia), 23 pages or 38 pages; Day em SUTAMA (D. M.Sturmer) work, "-- hetero cyclic and party UNZU - special TOPICS in hetero cyclic chemistry (Heterocyclic Compounds-Special topics in heterocyclic chemistry)" -- Chapter 18, Section 14, the 482-515th page, John Willie -, and - Suns (John Wiley & Sons) New York, London,; (1977 annual publications) "ROZZU chemistry OBU carbon party UNZU (Rodd's Chemistry of CarbonCompounds)", (2nd.Ed.vol.IV, part B, 1977 annual publications), Chapter 15, The 369-422nd page, (2nd.Ed.vol.IV, part B, 1985 annual publications), Chapter 15, the 267-296th page, ERUSU buyer science public

company ink (Elsevier Science Public Company Inc.), New York, etc. are mentioned.

[0048] The cyanine dye which has a univalent counter ion in a suitable solvent as the technique of introducing the anion of a multiple valued as a counter ion is melted, the acid of a multiple valued or the solution of the salt is added to this, the solvent which cannot dissolve coloring matter further easily if needed is added, and it is suitable for a lot of [ that the method of making the crystal of the cyanine dye which makes a multicharged ion a counter ion deposit is the simplest, and ] composition. The method of exchanging counter ions, using ion exchange resin as the other methods is mentioned.

[0049] Next, a synthetic example is given and the synthesis method of the compound concerning this invention is explained concretely.

[A synthetic example]

(Composition of a compound 4) The anion section of a compound 4 compounded the compound which is Para toluenesulfonic acid ion by the conventional method. After melting 26.8g (0.04 mols) of this compound to a 400ml methanol, naphthalene -1 and 7.2g (0.02 mols) of 5-disulfon acids were added, and it stirred at 50 degrees C for 1 hour. After cooling, the produced crystal was separated, it washed, having covered the methanol, and one evening dried at 50 degrees C (yield of 22.3g, 238 degrees C of melting points).

[0050] The optical information record medium of this invention has on a substrate a record layer containing the cyanine-dye compound expressed with the general formula (I) mentioned above. The cyanine-dye compound concerning this invention can be advantageously used in CD-R or DVD-R as an optical information record medium. The coloring matter compound which has the India renin nucleus or a benzo INDO renin nucleus with a TORIMECHIN chain in an optical DVD-R type information record medium especially in the cyanine-dye compound expressed with the general formula (IIA) mentioned above is used advantageously.

[0051] As for the optical information record medium of this invention, it is desirable that they are the following composition. As for an optical CD-R type information record medium, it is desirable that it is the composition of having a record layer, a light reflex layer, and a protective layer on a transparent disk-like substrate with a thickness of  $1.2 \times 0.2\text{mm}$  at this order for the diameter of  $120 \times 0.3\text{mm}$  in which the pre groove of 1.4-1.8 micrometers of track pitches was formed. Moreover, as for an optical DVD-R type information record medium, it is desirable that they are the following two modes. What was constituted by the layered product of two sheets which comes to prepare a record layer and a light reflex layer for the diameter of  $120 \times 0.3\text{mm}$  in which the pre groove of 0.6-0.9 micrometers of track pitches was formed on a transparent disk-like substrate with a thickness of  $0.6 \times 0.1\text{mm}$  being joined so that each record layer may serve as the inside, and becoming  $1.2 \times 0.2\text{mm}$  in thickness. Or the layered product which comes to prepare a record layer and a light reflex layer for the diameter of  $120 \times 0.3\text{mm}$  in which the pre groove of 0.6-0.9 micrometers of track pitches was formed on a transparent disk-like substrate with a thickness of  $0.6 \times 0.1\text{mm}$ , and the disk-like substrate of this layered product and the same disk-like protective-group board with a transparent configuration are joined so that a record layer may serve as the inside, and it is constituted so that it may become  $1.2 \times 0.2\text{mm}$  in thickness. In addition, in an optical above-mentioned DVD-R type information record medium, it can also consider as the composition which prepared the protective layer further on the light reflex layer.

[0052] Below, the manufacture method of an optical information record medium is explained. An optical DVD-R type information record medium can be manufactured using the material fundamentally used for manufacture of the optical information record medium of CD-R except using the substrate in which the pre group of a narrower track pitch was formed compared with CD-R, in order to attain higher recording density. That is, the optical information record medium of DVD-R can be manufactured creating on a substrate a record layer and a light reflex layer, and two layered products that formed the protective layer in order by request further, and joining these two sheets with adhesives, or by joining similarly this layered product, and the substrate of this layered product and the disk-like protective-group board of the same configuration with adhesives again. Therefore, on the occasion of manufacture of the optical information record medium of DVD-R, processes other than the junction process of the substrates which are the last processes are carried out by the same method as the optical information

record medium of CD-R.

[0053] The optical information record medium of this invention can be manufactured by method which is described below. The substrate of an optical information record medium can be chosen as arbitration from various kinds of material used as a substrate of the conventional optical information record medium. As a substrate material, a vinyl chloride system resin; epoxy resin; amorphous polyolefine, polyester, etc., such as acrylic resin; polyvinyl chlorides, such as a glass; polycarbonate; polymethylmethacrylate, and a vinyl chloride copolymer, can be mentioned, for example, and they may be used together by request. In addition, such material can be used as a substrate which has rigidity as the shape of a film. In the above-mentioned material, points, such as moisture resistance, dimensional stability, and a price, to a polycarbonate is desirable.

[0054] Undercoat may be prepared in the near substrate front face in which a record layer is prepared for an improvement of smoothness, the improvement in adhesive strength, and the purpose of prevention of a record layer. As a material of undercoat, for example, a polymethylmethacrylate, an acrylic acid and a methacrylic-acid copolymer, A styrene maleic anhydride copolymer, polyvinyl alcohol, N-methylol acrylamide, A styrene vinyltoluene copolymer, crawl sulfonation polyethylene, A nitrocellulose, a polyvinyl chloride, a chlorination polyolefine, polyester, Surface-treatment agents, such as polymeric-materials [, such as a polyimide, vinyl acetate and a vinyl chloride copolymer an ethylene vinylacetate copolymer, polyethylene, polypropylene, and a polycarbonate, ]; and a silane coupling agent, can be mentioned. Undercoat can be formed by applying this application liquid to a substrate front face by the applying methods, such as a spin coat, a DIP coat, and an extrusion coat, after dissolving or distributing the above-mentioned matter to a suitable solvent and preparing application liquid. Generally the thickness of undercoat is in the range of 0.005-20 micrometers, and the range of it is 0.01-10 micrometers preferably.

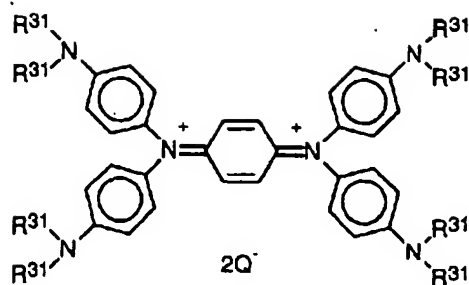
[0055] On the substrate (or undercoat), the irregularity (pre groove) which usually expresses information, such as a slot for tracking or an address signal, is formed. As for this pre groove, it is desirable to form resin material, such as a polycarbonate, on a direct substrate, injection molding or in case extrusion molding is carried out. In a pre groove, the pitch (track pitch) changes with a CD-R type and DVD-R types. Usually, in a CD-R type, it is desirable to be formed by the track pitch with a width of face of 1.4-1.8 micrometers. Moreover, in a DVD-R type, it is desirable to be formed by the track pitch with a width of face of 0.6-0.9 micrometers.

[0056] As for the depth of a pre groove, it is desirable that it is in the range of 300-2000Å, and, as for the half-value width, it is desirable that it is in the range of 0.2-0.9 micrometers. Moreover, sensitivity can be raised without reducing most reflection factors by making the depth of a pre groove into the range of 1500-2000Å, and it becomes advantageous to manufacture of an optical CD-R type information record medium especially.

[0057] A coloring matter record layer is prepared on a base. The cyanine-dye compound expressed with a coloring matter record layer by the general formula (I) mentioned above contains. Moreover, you may use together coloring matter other than the cyanine-dye compound shown by the general formula (I), and other compounds. A thing desirable as coloring matter used together in a record layer is dicarbocyanine coloring matter which has a benzo INDO renin nucleus, and this is desirable especially when used as a CD-R. As for a record layer, it is desirable to contain the various compounds known as a singlet-oxygen quencher in order to raise the lightfastness of a record layer further. As a singlet-oxygen quencher, the thing of a publication can already be used for publications, such as a well-known patent specification. As the example, JP,58-175693,A, 59-81194, 60-18387, 60-19586, 60-19587, 60-35054, 60-36190, 60-36191, 60-44554, 60-44555, 60-44389, 60-44390, 60-54892, 60-47069, the number for each official report [, such as 63-209995, JP,4-25492,A, JP,1-38680,B, and 6-26028 ], German JP,350399,B specification, and Japanization study society magazine October, 1992 -- the thing of a publication can be mentioned to the 1141st page etc.

[0058] As an example of a desirable quencher, it is the following general formula (III). The compound expressed can be mentioned.

[0059] General formula (III) : [Formula 17]



[However, R31 expresses the alkyl group which may have the substituent, and Q- expresses an anion.]  
 [0060] General formula (III) It sets, and R31 has the common alkyl group of the carbon numbers 1-8 which may be replaced, and its alkyl group of the non-replaced carbon numbers 1-6 is desirable. As a substituent of an alkyl group, a halogen atom (an example, F, Cl), an alkoxy group (an example, a methoxy, ethoxy), an alkyl thio machine (an example, a methylthio, ethyl thio), an acyl group (an example, an acetyl, propionyl), an acyloxy machine (an example, acetoxyl, propionyl), a hydroxy group, an alkoxy carbonyl group (an example, a methoxycarbonyl, ethoxycarbonyl), an alkenyl machine (an example, vinyl), and an aryl group (In these, a halogen atom, an alkoxy group, an alkyl thio machine, and an alkoxy carbonyl group are desirable. Q- As an example of \*\*\*\*\*, ClO<sub>4</sub><sup>-</sup>, AsF<sub>6</sub><sup>-</sup>, BF<sub>4</sub><sup>-</sup>, and SbF<sub>6</sub><sup>-</sup> are desirable.

[0061] General formula (III) About the example of a compound, it is R31 and Q in a formula. - By showing an example indicates below.

III-1:R31=CH<sub>3</sub>, Q=ClO<sub>4</sub><sup>-</sup> III-2:R31=C<sub>2</sub>H<sub>5</sub> Q=ClO<sub>4</sub><sup>-</sup> III-3:R31=n-C<sub>3</sub>H<sub>7</sub>, Q=ClO<sub>4</sub><sup>-</sup> III-4:R31=n-C<sub>4</sub>H<sub>9</sub>, Q=ClO<sub>4</sub><sup>-</sup> III-5:R31=n-C<sub>5</sub>H<sub>11</sub> Q=ClO<sub>4</sub><sup>-</sup> III-6:R31=n-C<sub>4</sub>H<sub>9</sub>, Q=SbF<sub>6</sub><sup>-</sup> III-7:R31=n-C<sub>4</sub>H<sub>9</sub> Q=BF<sub>4</sub><sup>-</sup> III-8:R31=n-C<sub>4</sub>H<sub>9</sub> Q=AsF<sub>6</sub><sup>-</sup> - [0062] Formation of a record layer can be performed by drying, after dissolving a quencher, a binder, etc. in a solvent by request further, preparing application liquid, applying this application liquid subsequently to a substrate front face and forming a paint film, the above-mentioned coloring matter and. As a solvent of pigment layer application liquid, ester; methyl ethyl ketones, such as butyl acetate and a cellosolve acetate, Ketones, such as a cyclohexanone and a methyl isobutyl ketone; Dichloromethane, Hydrocarbons [ , such as a chlorinated-hydrocarbon; dimethylformamide / , such as an amide; cyclohexane ], such as 1, 2-dichloroethane, and chloroform; A tetrahydrofuran, The ether, such as ethyl ether and a dioxane; Ethanol, n-propanol, Fluorine system solvents, such as alcoholic;2, such as an isopropanol and n-butanol diacetone alcohol, 2 and 3, and 3-tetrapod FURORO propanol; An ethylene glycol monomethyl ether, Glycol ethers, such as ethylene glycol monoethyl ether and a propylene glycol monomethyl ether, can be mentioned. the above-mentioned solvent is independent in consideration of the solubility of the coloring matter to be used -- or two or more sorts can be used together and it can use suitably In application liquid, you may add [ for the purpose of various kinds of additives, such as an antioxidant, UV absorbent, a plasticizer and lubricant ] further.

[0063] When using a binder, as an example of a binder For example, natural organic polymeric-material; and polyethylene, such as gelatin, a cellulosic, a dextran, rosin, and rubber, Hydrocarbon system resins, such as polypropylene, polystyrene, and a polyisobutylene, Vinyl system resins, such as a polyvinyl chloride, a polyvinylidene chloride, and a polyvinyl chloride polyvinyl acetate copolymer, Acrylic resin, such as a polymethylacrylate and a polymethyl methacrylate, Synthetic organic macromolecules, such as an initial condensate of thermosetting resin, such as polyvinyl alcohol, a chlorinated polyethylene, an epoxy resin, a butyral resin, a rubber derivative, and phenol-formaldehyde resin, can be mentioned.

When using a binder together as a material of a record layer, generally the amount of the binder used is in the range of an amount (weight ratio) an amount - 50 times 0.01 times to coloring matter, and is in the range of an amount (weight ratio) an amount - 5 times 0.1 times preferably. Thus, generally the concentration of the application liquid prepared is in 0.01 - 10% of the weight of the range, and is in 0.1 - 5% of the weight of the range preferably.

[0064] As the method of application, a spray method, the spin coat method, the dipping method, the roll

coat method, the blade coat method, the doctor-roll method, screen printing, etc. can be mentioned. A monolayer or multilayer are sufficient as a record layer. Generally the thickness of a record layer is in the range of 20-500nm, and is in the range of 50-300nm preferably.

[0065] On a record layer, a light reflex layer is prepared for the purpose of improvement in the reflection factor at the time of informational reproduction. The light reflex nature matter which is the material of a light reflex layer is matter with the high reflection factor to a laser beam. as the example Mg, Se, Y, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, A metal and a semimetal, or stainless steel, such as W, Mn, Re, Fe, Co, nickel, Ru, Rh, Pd, Ir, Pt, Cu, Ag, Au, Zn, Cd, aluminum, Ga, In, Si, germanium, Te, Pb, Po, Sn, and Bi, can be mentioned. Things desirable [ among these ] are Cr, nickel, Pt, Cu, Ag, Au, aluminum, and stainless steel. These matter may be used independently, or is two or more sorts of combination, or may be used as an alloy. A light reflex layer can form for example, the above-mentioned light reflex nature matter on a record layer vacuum evaporation, sputtering, or by carrying out ion plating. Generally, the thickness of a light reflex layer is in the range of 10-300nm, and its range of 50-200nm is desirable.

[0066] On a light reflex layer, a protective layer is prepared in order to protect a record layer etc. physically and chemically. In addition, in manufacture of an optical DVD-R type information record medium, the attachment of a protective layer is not necessarily required. as the example of the material used for a protective layer -- SiO, SiO<sub>2</sub>, MgF<sub>2</sub>, SnO<sub>2</sub>, and Si<sub>3</sub>N<sub>4</sub> etc. -- organic substances, such as a mineral matter, thermoplastics, thermosetting resin, and UV hardenability resin, can be mentioned A protective layer can be formed by laminating the film obtained with the extrusion of plastics on a reflecting layer through adhesives. Or it may be prepared by methods, such as vacuum deposition, sputtering, and an application. Moreover, in the case of thermoplastics and thermosetting resin, after dissolving these in a suitable solvent and preparing application liquid, this application liquid can be applied and it can form also by drying. After dissolving in a solvent remaining as it is or suitable in the case of UV hardenability resin and preparing application liquid, this application liquid can be applied, and it can form also by irradiating UV light and stiffening it. In these application liquid, you may add [ for the purpose of various additives, such as an antistatic agent, an antioxidant, and UV absorbent, ] further. Generally the thickness of a protective layer is in the range of 0.1-100 micrometers. According to the above process, the layered product by which the record layer, the light reflex layer, and the protective layer were prepared on the substrate can be manufactured.

[0067] An optical CD-R type information record medium can be manufactured according to the above-mentioned process. Moreover, optical DVD-R type information record intermediation can be manufactured by joining mutually the layered product of two sheets manufactured as mentioned above using facing each other and adhesives so that a mutual record layer may serve as the inside. Or the layered product manufactured as mentioned above again, the substrate of this layered product, and the disk-like protective-group board of the same configuration can be manufactured by joining using facing each other and adhesives mutually so that a record layer may serve as the inside similarly.

[0068] The optical information record method of this invention is performed as follows, using the above-mentioned optical information record medium. First, the light for record of semiconductor laser light etc. is irradiated from a substrate side, rotating an optical information record medium with a constant linear velocity (in CD format, it is 1.2-14m/second), or a constant angular velocity. It is thought that a cavity is formed in the interface of a record layer and a reflecting layer (formation of a cavity is formed with deformation of a record layer or a reflecting layer or deformation of both layers), or a substrate carries out padding deformation by irradiation of this light, or information is recorded when a refractive index changes with change of discoloration and a meeting state etc. to a record layer. The semiconductor laser beam which generally has the oscillation wavelength of the range of 500nm - 850nm as a record light is used. In this invention, the semiconductor laser beam which has the oscillation wavelength of the range of 630-680nm is used as what the semiconductor laser beam which has the oscillation wavelength of the range of 770-790nm was used as a thing suitable for CD-R, and was suitable for DVD-R. A desirable thing is a red laser beam which has the oscillation wavelength of the range of 635-645nm. Reproduction of the information recorded as mentioned above irradiates semiconductor laser light from a substrate side, rotating an optical information record medium with the

same constant linear velocity as the above, and can be performed by detecting the reflected light.

[0069]

[Example] Below, the example of this invention is indicated. However, each of these examples do not restrict this invention.

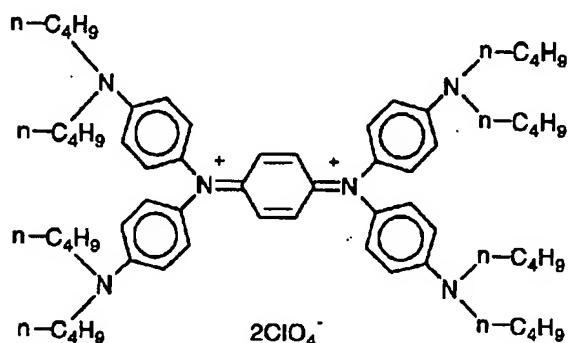
The quencher (compound shown by the following formula (III-4)) of the weight equivalent to 10% of the weight of the [example 1] aforementioned cyanine-dye compound (4) and this compound was dissolved in 2, 2, 3, and 3-tetrafluoro propanol, and the application liquid for record stratification was obtained. This application liquid was applied to the front face by the side of the pre groove of the polycarbonate substrate (diameter : 120mm, thickness : 1.2mm) by which the spiral pre groove (track pitch : 1.6 micrometers, groove width of face : 0.4 micrometers, the depth of a groove : 0.17 micrometers) was formed in the front face with injection molding with the spin coat, and the record layer (thickness (inside of a pre groove) : about 200nm) was formed.

[0070] Next, on the record layer, the spatter of the Au was carried out and the light reflex layer with a thickness of about 100nm was formed. Furthermore, on the light reflex layer, UV hardenability resin (the UV curing agent 3070, three bond company make) was applied, ultraviolet rays were irradiated, and the protective layer of 3 micrometers of thickness was formed. The optical CD-R type information record medium which follows this invention according to the above process was obtained.

[0071]

[Formula 18]

(III-4)



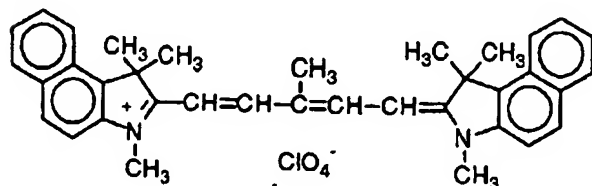
[0072] In the [examples 2-3] example 1, the optical CD-R type information record medium which follows this invention like an example 1 was obtained except having carried out the amount use of said of the cyanine-dye compound (example 2 : aforementioned cyanine-dye compound (8) and example 3: the aforementioned cyanine-dye compound (11)) shown in Table 1 instead of the aforementioned cyanine-dye compound (4).

[0073] In the [example 1 of comparison] example 1, the optical information record medium CD-R type [ for comparison ] was obtained like the example 1 except having carried out the amount use of said of the cyanine-dye compound (compound B-1) with which a following univalent anion and a following univalent cyanine-dye univalent cation component combined, and were carried out instead of the aforementioned cyanine-dye compound (4).

[0074]

[Formula 19]

B-1



[0075] In the [example 2 of comparison] example 1, the optical information record medium (CD-R) for

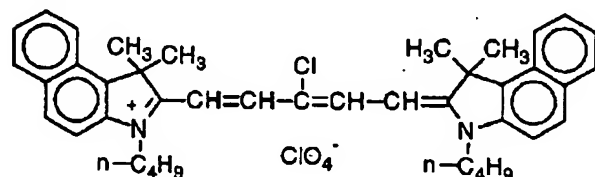


comparison was obtained like the example 1 except having carried out the amount use of said of the cyanine-dye compound (compound B-2) with which a following univalent anion and a following univalent cyanine-dye univalent cation component combined, and were carried out instead of the aforementioned cyanine-dye compound (4).

[0076]

[Formula 20]

B-2

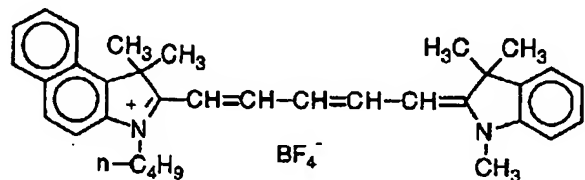


[0077] In the [example 3 of comparison] example 1, the optical information record medium (CD-R) for comparison was obtained like the example 1 except having carried out the amount use of said of the cyanine system coloring matter compound (compound B-3) with which the following univalent anion and the cyanine-dye monovalent cation component combined, and were carried out instead of the aforementioned cyanine-dye compound (4).

[0078]

[Formula 21]

B-3



[0079] The EFM signal of 3T and 11T was recorded for the optical information record medium [evaluation [ as an optical information record medium ]] Obtained by 4X using the path stick company OMT2000, and the jitter in the power dependency and the optimal record power of a modulation factor was measured. The wavelength of a laser beam was 780nm. The obtained evaluation result is shown in Table 1.

[0080]

[Table 1]

Table 1 ----- Coloring matter To record power 7mW A jitter (ns) No.  
Modulation factor which can be set (%) 3T 11T ----- Example 1 4 72 8.2 8.4  
Example 2 8 70 8.0 8.3 Example 3 11 69 8.1 8.4 ----- Example 1 of  
comparison B-1 65 10.5 10.9 Example 2 of comparison B-2 64 10.7 11.0 Example of comparison 3 B-3  
66 11.0 11.4 ----- [0081] CD-R (examples 1-3) which has a record layer  
containing the cyanine-dye compound applied to this invention with which a divalent anion and two  
cyanine-dye univalent cations were combined from the result of the above-mentioned table 1 shows the  
high modulation factor compared with CD-R (examples 1-3 of comparison) which has a record layer  
containing the conventional cyanine-dye compound which consists of a univalent anion and a cyanine-  
dye univalent cation. Therefore, it turns out that high signal strength can be obtained. Moreover, since a  
jitter also shows a low value, a reading error cannot take place easily, and CD-R according to this  
invention is considered to be suitable for high-speed record reproduction.

[0082] The quencher (compound shown by the formula (III-4) used in the aforementioned example 1) of the weight equivalent to 10% of the weight of the [example 4] aforementioned cyanine-dye compound (17) and this compound was dissolved in 2, 2, 3, and 3-tetrafluoro propanol, and the application liquid for record stratification was obtained. This application liquid was applied to the front face by the side of

the pre groove of the polycarbonate substrate (diameter : 120mm, thickness : 0.6mm) by which the spiral pre groove (track pitch : 0.8 micrometers, groove width of face : 0.4 micrometers, the depth of a groove : 0.15 micrometers) was formed in the front face with injection molding with the spin coat, and the record layer (thickness (inside of a groove) : about 200nm) was formed.

[0083] On the record layer, the spatter of the Au was carried out, the light reflex layer with a thickness of about 100nm was formed, and the layered product by which the record layer and the light reflex layer were prepared in this order on the substrate was created. Independently, the transparent polycarbonate substrate (disk-like protective-group board) (diameter : 120mm, thickness : 0.6mm) was prepared. And the layered product and disk-like protective-group board which were obtained above were joined using adhesives (three bond company make) so that a record layer might serve as the inside (1.2mm in thickness). The optical DVD-R type information record medium which follows this invention according to the above process was obtained.

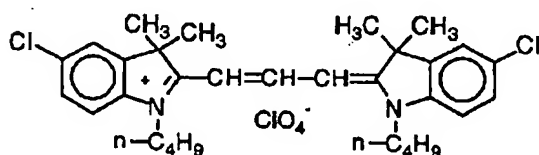
[0084] In the [example 5] example 4, the optical DVD-R type information record medium which follows this invention like an example 4 was obtained instead of the aforementioned cyanine-dye compound (17) except having carried out the amount use of said of the aforementioned cyanine-dye compound (19).

[0085] In the [example 4 of comparison] example 4, the optical information record medium DVD-R type [ for comparison ] was obtained like the example 4 except having carried out the amount use of said of the cyanine-dye compound (compound C-1) with which the following following univalent anion and the cyanine-dye monovalent cation component combined, and were carried out instead of the aforementioned cyanine-dye compound (17).

[0086]

[Formula 22]

C-1

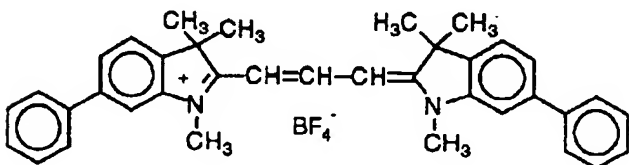


[0087] In the [example 5 of comparison] example 4, the optical information record medium (DVD-R) for comparison was obtained like the example 4 except having carried out the amount use of said of the cyanine-dye compound (compound C-2) with which the following following univalent anion and the cyanine-dye monovalent cation component combined, and were carried out instead of the aforementioned cyanine-dye compound (17).

[0088]

[Formula 23]

C-2



[0089] To the optical information record medium [evaluation [ as an optical information record medium ]] Obtained, semiconductor laser light with a wavelength of 635nm is condensed with the lens of NA0.6, and they are linear-velocity 3.68 m/s and modulation frequency 4MHZ. The signal was recorded and the jitter in the power dependency and the optimal record power of a modulation factor was measured. The obtained evaluation result is shown in Table 2.

[0090]

[Table 2]

table 2 [ ] ----- Coloring matter Record power 8mW It can set to the optimal power. No. Modulation factor (%) which can be set Jitter (ns)

----- example 4 17 68 8 Example 5 19 67 8 -----  
 Example 4 of comparison C-1 60 10 Example 5 of comparison C-2 61 11 -----  
 [0091] DVD-R (examples 4-5) which has a record layer containing the cyanine-dye compound applied to this invention with which a divalent anion and two cyanine-dye univalent cations were combined from the result of the above-mentioned table 2 shows the high modulation factor compared with DVD-R (examples 4-5 of comparison) which has a record layer containing the conventional cyanine-dye compound which consists of a univalent anion and a cyanine-dye univalent cation. Therefore, it turns out that high signal strength can be obtained. Moreover, since a jitter also shows a low value, a reading error cannot take place easily, and DVD-R according to this invention is considered to be suitable for high-speed record and reproduction.

[0092]

[Effect of the Invention] By using the cyanine-dye compound with which it comes to put two or more cyanine-dye cation components corresponding to the multiple-valued anion concerning this invention, and this valence together, the optical information record medium in which a high modulation factor is shown can be obtained. Even when using especially the laser beam of a visible region, there is no fall of a modulation factor, therefore it can be called a cyanine-dye compound advantageous to DVD-R. Moreover, when the specific cyanine-dye compound concerning this invention is applied to CD-R, a high reflection factor can also be simultaneously attained with a high modulation factor, therefore it can use advantageously also in CD-R.

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[Translation done.]